RESPONSE OF *CANDIDA ALBICANS*, *C.GLABRATA* AND *SACCHAROMYCES CEREVISIAE* TO CHLORHEXIDINE

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Although yeasts and moulds are important pathogens and spoilage organisms, the effects of antiseptics, disinfectants and preservatives are poorly understood. Here, we describe the effects of a bisbiguanide, chlorhexidine diacetate (CHA) on a yeast (Saccharomyces cerevisiae), a yeast-like fungus (Candida albicans) and a yeast that does not form pseudohyphae (C.glabrata). Strains consisted of Sacch. cerevisiae A 364A (wild type), its mannoprotein mutants LB1 - 10B (defective α1 - 3-mannosyl-transferase), LB1 - 3B (defective α1 - 2-mannosyltransferase-II) and LB 6 - 5D (mannoprotein is unphosphorylated) and its permeability mutants 2512C - 2A (defective general amino acid permease) and RA68 (all obtained from the University of California, Berkley, U.S.A.); C.albicans NCYC 1363 and C.glabrata NCYC 388. Minimum inhibitory concentrations (MICs) were determined after incubation for 24hr at 30°C in Sabouraud Broth (Oxoid). Inactivation of Sacch. cerevisiae A 364 and the Candida strains were measured when cells (initial density ca. 5 - 10 x 10^6 cfu/ml) were exposed as washed suspensions to different CHA concentrations at 30°C; excess CHA was quenched by dilution in Sabouraud broth containing 0.75% Azolectin and 5% polysorbate 80 and colonies counted after incubation of Sabouraud agar plates for 24 hr at 30°C.

MICs of CHA were 10 µg/ml against Sacch. cerevisiae A346A, 4 and 8 µg/ml for RA 68 and 2512C-2A, respectively and 16, 8 and 8 µg/ml respectively against the mannoprotein mutants LB6-5D, LB1-10B and LB1-3B. The mannoprotein mutants are being studied to determine the effect of the mannan content of the yeast cell wall on chlorhexidine sensitivity. It is not as yet possible to reach a definite conclusion although MIC values suggest it has only a minor role. C.glabrata was inhibited by 20 µg/ml and C.albicans by 20-30µg/ml (in the presence of 200 µg/ml mercaptoethanol, this was reduced to 10-15µg/ml). All these organisms are inhibited by CHA concentrations that are much higher than those (1-2µg/ml) needed to prevent bacterial growth (Russell & Gould 1988). The decreased sensitivity of yeasts, however, suggests either a cell wall permeability barrier and/or reduced plasma membrane sensitivity to CHA. CHA was fungicidal (Table 1) although Sacch. cerevisiae was killed more rapidly and to a greater extent than the two Candida strains.

Table 1. Fungicidal activity of chlorhexidine diacetate (CHA)

Organism	CHA concn.	Fungicidal activity
Sacch.cerevisiae	10	2 log reduction, 4 min
A364A	100)	>6 log reduction, <20 sec
	1000)	
C.albicans	10	No loss of viability
	100	2 log reduction, 3.5 min
	1000	2 log reduction, <20 sec
C.glabrata	10	No loss of viability
	100	2 log reduction, 5.5 min
	1000	2 log reduction, <20 sec

Russell, A.D., Gould, G.W. (1988) J. appl. Bact., Symp. Suppl. 65: 167S-195S.